English

Multivision® Pro

Installation and Operation

MV19p, MV16p,
MV94p, MV99p, MV96p

Part Number 8000-2135-01 REV B

ROBOT®

English

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Purchase Date: _____

Serial Number: _____

Robot Dealer:

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SECURITY MEASURES

NOTE: This page describes how to access security sensitive features. You may wish to remove this page from the manual and place it in a secure place.

Accessing Setup Menus

The setup menu system is accessed from live mode. Press and hold the **function** button and press the **zoom** button (**function+zoom**). The first setup menu appears on screen. Use the **zoom** and **arrow** buttons to navigate through the menu system. See *Chapter 4 — Setup* for details.

To exit the setup menu system, press **function+zoom** again. The menu disappears and the multiplexer resumes normal operation.

The Security Lock Feature

NOTE: Security Lock protects the multiplexer against unauthorized use by disabling all front panel controls except the FUNCTION and ZOOM buttons. Once engaged, Security Lock can be released only after placing the multiplexer in setup mode.

To Engage or Release Security Lock

1. Select the operating mode in which the unit is to be locked.
2. Press and hold the **function** button and press the **zoom** button. The multiplexer enters setup mode and displays the first setup menu.
3. Press the zoom button repeatedly until the SECURITY LOCK menu appears.
4. Press the up or down arrow to engage (**ON**) or release (**OFF**) SECURITY LOCK.
5. Press **function+zoom** to exit setup mode. The multiplexer resumes normal operation.

(Cut along this line)

Resetting the Multiplexer

The multiplexer can be reset to the factory default state. Upon reset, all programmable features return to the factory settings. The reset feature is normally used for diagnostic purposes but may be used to "start from scratch" during system setup.

To Reset the Multiplexer

Press and hold the **function** button and press the **up arrow** button. A warning appears, asking if you want to reset the unit to factory defaults. Press **live** to cancel the reset. To continue the reset, press **function+up arrow**. The multiplexer resets and returns to the factory default state.

Chapter 1 — Features

MULTIVISION PRO FEATURES

- High speed switching rate while recording.
- Automatic VCR speed detection feature lets the multiplexer match the VCR's current recording speed.
- Full duplex operation allows video recording while viewing live video or playing back a tape.
- Simultaneous digital video motion detection using two 16x12 target motion detection grids for each video channel to set different options for day and night. Selectable target placement, object size, target sensitivity and alarm delay.
- Independent main and call monitor outputs allow simultaneous multicamera and full screen viewing.
- Dynamic Time Division (DTD) multiplexing allocates camera recording time based on picture motion content.
- Contact and TTL/CMOS alarm signals for VCR or other equipment.
- Alarm event counter with on-screen summary by camera.
- Motion alarm status table lists settings on-screen by camera for both day and night.
- Easy on-screen system setup. On-screen display includes date, time, alarm status, video loss and 10-character camera titles.
- Image Tenderizer dramatically reduces jitter associated with high resolution compressed multicamera images.
- Improved Remote Control Panel option permits daisy chaining up to 16 multiplexers and changing the controlled multiplexer.
- Live or tape playback views include: full-screen, 2x zoom from full screen view, Picture-In-Picture (PIP), 2x2, 3x3 and 4x4.
- High resolution digital images enhanced by proprietary sharpening technique. Outstanding quality with a 512x464 (512x512 PAL) pixel display, 256 grays and 16 million colors.
- Rear panel termination switches can be set for each camera.
- Compatible with color and B&W video cameras or other NTSC/EIA (PAL/CCIR) standard video sources. Video synchronization is not required.
- Video inputs and outputs provided for both standard and Super VHS video cassette recorders (except B&W units).
- Nonvolatile program memory protects all programmable features against power loss.

TECHNICAL OVERVIEW

The Multivision Pro series includes MV94p, MV99p, MV96p color multiplexers and MV19p, MV16p B&W multiplexers.

Video Input and Output

The multiplexer is available configured for either NTSC / EIA or PAL / CCIR video standard. The unit features video camera inputs with a passive looping output for each. Camera input impedance termination is set independently for each camera using switches on the back panel. Synchronizing or phasing cameras is not required.

Video recording and playback is supported by VCR connections for both composite and S-Video signal formats (color units only). The multiplexer automatically determines the format used during tape playback.

Two monitor outputs allow viewing live camera or videotaped pictures on standard monitors. The main monitor displays selected cameras in any available display format. The call monitor displays any alarm images or any live camera image full screen.

Motion Detection

The multiplexer continuously monitors all camera inputs for motion. When motion is detected, the multiplexer increases how often that camera is recorded and displayed. If the motion alarm feature is ON, the multiplexer also alerts the operator with blinking panel LEDs. It also sounds an alarm tone and encodes camera images as ALARM if those setup menu options are ON. Motion detection options for day and for night can be set for each camera input using a 192-target (16 wide by 12 high) graphic overlay. This allows using more effective settings for alarm delay, object size, sensitivity and target position for the two time periods. You can also set motion alarms ON for night and OFF for day, or vice-versa.

Video Display

The main monitor displays either live camera pictures or pictures from tape. The display is based on a 512x512x16 (512x464x16 NTSC / EIA) bit digital video memory containing two interlaced video fields. As many as 256 gray shades and 16 million colors can be displayed in six screen formats: full screen, 2x zoom, Picture-In-Picture (PIP), 2x2, 3x3 (9 and 16-camera models only) and 4x4 (16-camera models only).

The call monitor displays full screen images of cameras associated with alarms or images from any selected camera. It is based on switched analog camera video.

Color demodulation is based on luminance and color difference processing. Demodulation circuitry operates on a line by line basis and will correctly demodulate chroma information conforming to the NTSC (PAL) video standard.

A graphic generator with two interlaced bit mapped pages provides the alphanumeric and graphic overlays required for on-screen menus, camera titles and system messages.

Encoder Output

The multiplexer video encoder produces a single video signal containing field by field samples from all camera inputs. The signal is provided in both composite and S-Video formats (color models only) for connection to a video recorder. Encoder operation is continuous and independent of display and decoder functions. All inputs are sampled in camera number order until motion is detected, when active cameras are sampled more often.

The encoder uses Vertical Interval Signaling (VIS) techniques to encode system information onto video output to the VCR. Time, date, camera title, camera number and alarm status information are placed on the 16 horizontal lines preceding the first active video line. This technique improves vertical synchronization recovery and improves graphics degraded by poor tape recorder performance.

Decoder Output

The multiplexer decoder processes the video output by the VCR during playback, recovering the video from each camera originally recorded. The decoder digitizes the playback video and recovers the VIS information encoded onto each field. The recovered field is written to the video display memory if required for display.

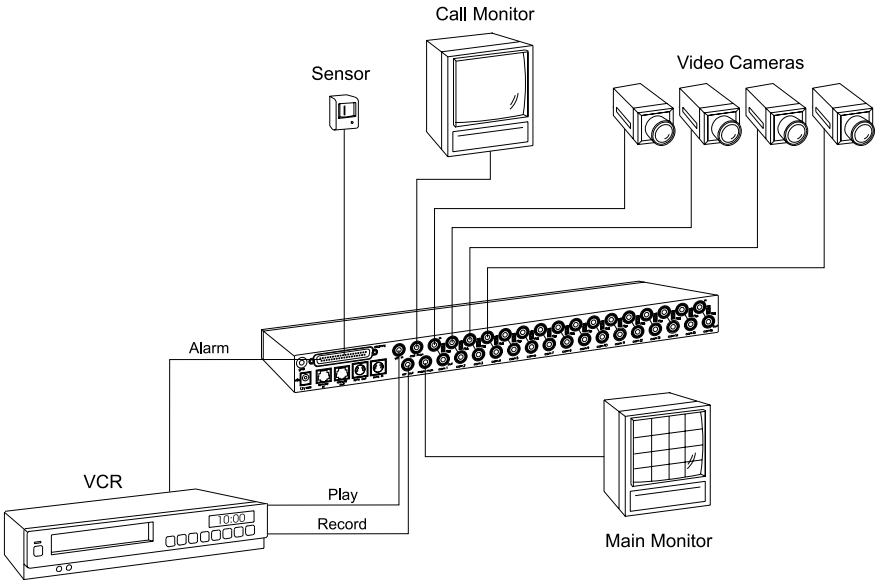

Figure 1 — Basic Multivision Pro System

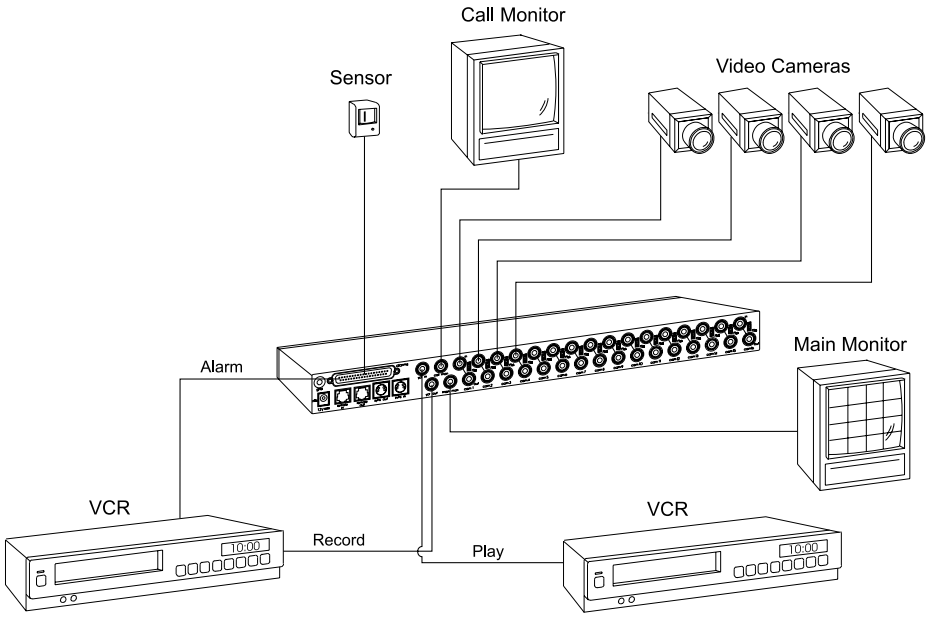

Figure 2 — Multivision Pro System with Two VCRs

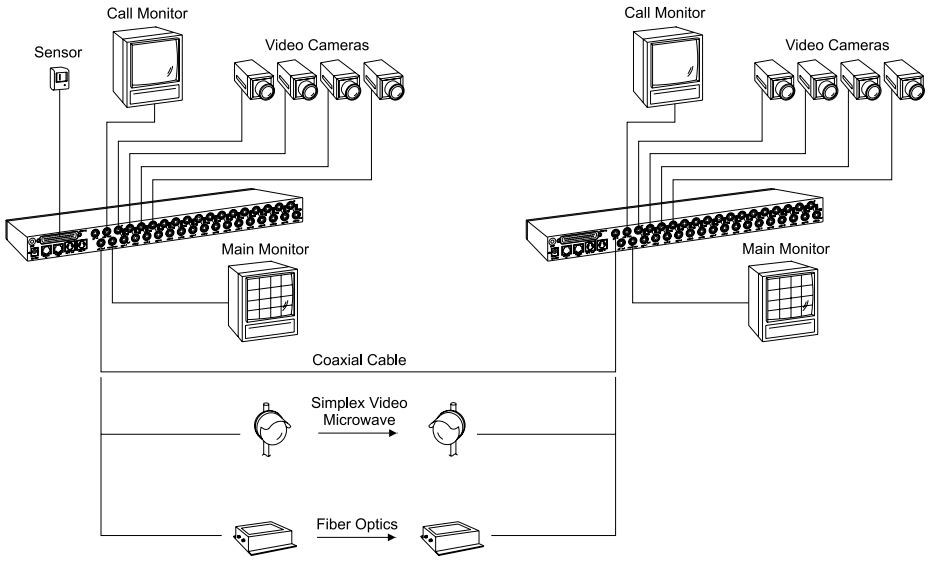

Figure 3 — One-Way Multiplexed Video Transmission

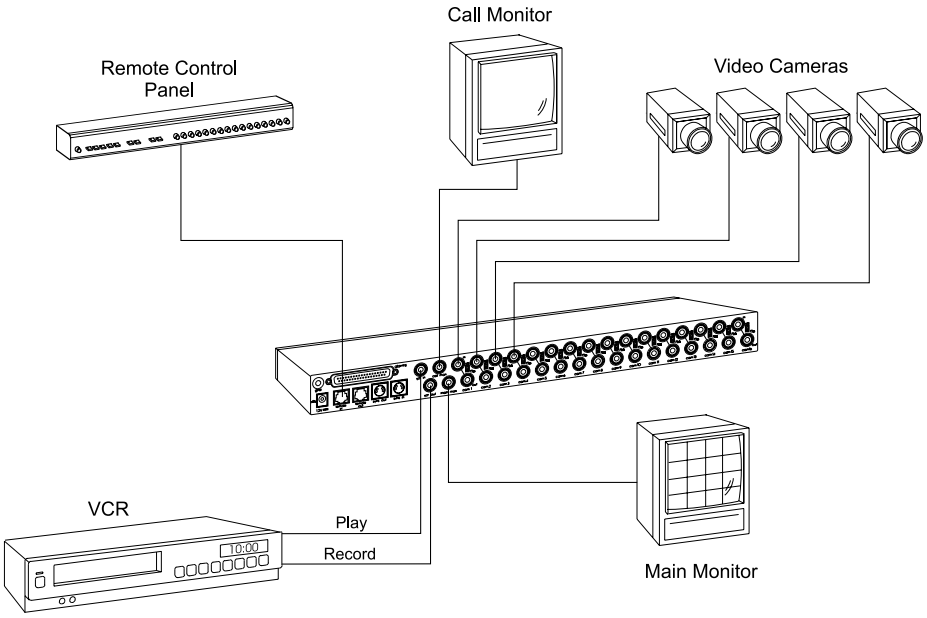

Figure 4 — Multivision Pro System with Remote Control Panel

Chapter 2 — Front & Rear Panels

The following is a brief overview of the multiplexer front and rear panels. Refer to *Chapter 4 — Setup* and *Chapter 5 — Operation* for a detailed discussion of multiplexer features and panel functions. Panel controls are illustrated below and each button is described by name and function.

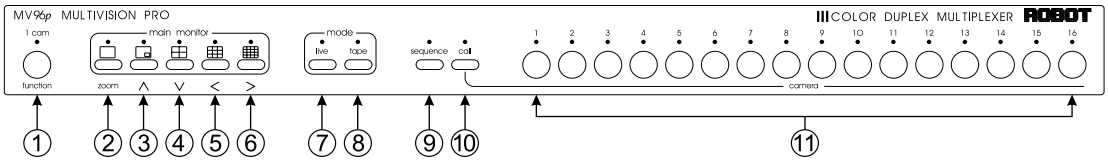

Figure 5 — Front Panel Controls and Indicators

THE FRONT PANEL

Some front panel buttons have dual functions. The primary function is listed first, followed by the secondary function (shown in parentheses). Indicator lights (LEDs) are above each button.

1. **function (1 cam) —** Used in combination with other buttons, it allows access to the system setup menus and other special functions described below.

To:	Press:
Display ALARM COUNTER	**function+left arrow**
Toggle time / date display	**function+right arrow**
Display MOTION ALARM STATUS TABLE	**function+down arrow**
Start 1 camera recording	**function (1 cam)**+ a camera button

2. **zoom (full screen) —** Press this button to view a 2x zoom of the selected camera. Press **zoom** again to go back to full screen view.

3. **up arrow (PIP—Picture-In-Picture) —** Displays the currently selected camera in the full screen format, inset with a 1/16 size picture of one other camera. The inset picture can be changed to a different camera or used for sequencing cameras. This button functions as an "up" control in the zoom and setup modes.

4. **down arrow (2x2) —** Displays up to four cameras in the 2x2 format. Cameras not already displayed can be sequenced in the lower right window. This button functions as a "down" control in the zoom and setup modes. Press **function+down arrow** to display the MOTION ALARM STATUS TABLE.

5. **left arrow (3x3) —** Displays up to nine cameras in the 3x3 format (9 and 16 camera models only). Cameras not already displayed can be sequenced in the lower right window. This button functions as a "left" control in the zoom and setup modes. Press **function+left arrow** to display the ALARM COUNTER.

6. **right arrow (4x4) —** Displays up to 16 cameras in the 4x4 format (16-camera models only). This button functions as a "right" control in the zoom and setup modes. Press **function+right arrow** to toggle the time / date display.

7. **live —** Displays the camera inputs in the selected format. It also turns on a row of motion targets in motion detection setup.

8. **tape —** Selects the VCR input for viewing. During tape playback, pressing the **tape** button displays recorded video in the selected format. During tape recording, this button permits monitoring images sent to the VCR. This button also turns off a row of motion targets during motion detection setup.

9. **sequence —** Starts automatic switching of cameras in the lower right corner of the screen (except in the full screen mode when it sequences full screen images). It also turns on all motion targets during motion detection setup.

10. **call —** Used before pressing a **camera (1–16)** button to select a camera for full screen display on the call monitor. This button also turns off all targets in motion detection setup.

11. **camera (1–16) —** Used to display cameras in the full screen format. Used with the **call** button to select a camera for full-screen display on the call monitor. During motion detection setup each **camera** button turns the corresponding motion target on the cursor line either off or on.

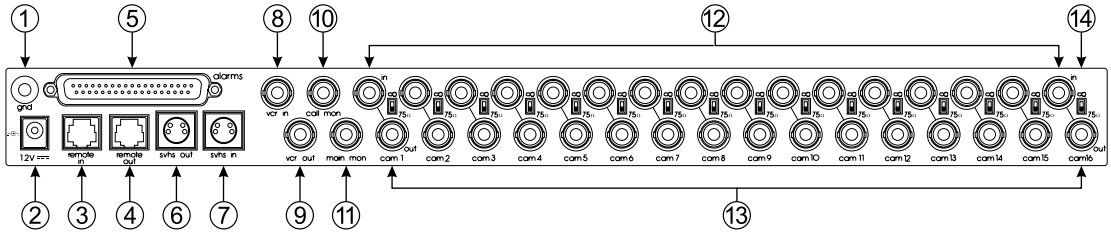

Figure 6 — Rear Panel Connectors (16-camera color model shown)

THE REAR PANEL

1. **gnd (ground) —** Use this ground post when connecting contact or TTL/CMOS compatible alarm devices. See *Alarms* for details.

2. **power —** This 2.1 mm pin jack accepts the multiplexer power module plug or other center positive source of 12 VDC at 1.5 amperes.

3. **remote in —** This RJ11 connector allows remote control of the multiplexer using an optional remote control panel. If daisychaining either additional remote panels or multiplexers, **remote out** of the first unit is connected to **remote in** of the next unit.

4. **remote out —** This RJ11 connector allows daisychaining to another multiplexer. Up to 16 multiplexers can be connected to a remote panel, but only one multiplexer at a time can be addressed and controlled by the remote control panel.

5. **alarms —** This DB37-S connector allows alarm activation via contact closure or TTL/CMOS alarm inputs (up to 16). It includes the alarm hold input and alarm output relay contacts. There are also 16 motion alarm outputs, and an autodetect VCR speed feature which changes the rate that the multiplexer sends images to match the VCR recording speed.

6. **s-vhs out —** This S-type connector provides an S-Video signal to an S-VHS video recorder (color models only).

7. **s-vhs in —** This S-type connector accepts the S-Video playback signal from an S-VHS video recorder (color models only).

8. **vcr in —** This BNC connector accepts the composite video playback signal from a VCR.

9. **vcr out —** This BNC connector provides a composite video signal to the record input of a VCR.

10. **call mon —** This BNC connector provides a composite video signal to the call monitor for the display of any alarm cameras (one at a time) or one live camera in the full screen format.

11. **main mon —** This BNC connector provides a composite video signal to the main monitor to display cameras in currently selected format.

12. **cam in —** These BNC connectors accept the composite video output of color or B&W cameras. Camera input impedance termination is selectable for each camera, using the small switch on the back panel. Use **75 Ω** for termination, or use **∞** if looping to other equipment.

13. **cam out —** These BNC connectors provide looping camera video from the corresponding camera input.

14. **∞ or 75 Ω switch —** These switches allow you to set impedance for each camera input. Set the switch to **75 Ω** to terminate it, or set it to **∞** if looping to other equipment.

Chapter 3 — Installation

Select a location for the product that is clean, dry and has AC power. Find an environment where temperature and humidity extremes do not exceed product specifications (see *Appendix D — Technical Specifications*). Failure to do so can result in equipment failure and loss of warranty protection.

REQUIRED CONNECTIONS

Cameras 1–16

Connect the video output from a camera or other composite video source to each **cam in**. Multiplexer camera input impedance termination is selectable for each camera using the back panel switches between the rows of BNC connectors. If looping through to other equipment, set the switch to ∞.

Main Mon

Connect **main mon** to the video input of an NTSC/EIA (PAL/CCIR) compatible video monitor. This monitor displays selected live or recorded cameras in any available format. This output must be terminated.

Power

Connect **power** to the multiplexer power module or other center positive source of 12 VDC at 1.5 Amperes.

OPTIONAL CONNECTIONS

Call Mon

Connect **call mon** output to the video input of an NTSC/EIA (PAL/CCIR) compatible video monitor. This monitor displays the selected or alarm camera in the full screen format. This output must be terminated.

VCR In

NOTE: Do NOT connect both vcr in and s-vhs in at the same time. The multiplexer will not function properly.

Connect **vcr in** to the composite video output (play) of an NTSC/EIA (PAL/CCIR) compatible VCR. This input is terminated.

VCR Out

NOTE: Do NOT connect both s-vhs out and vcr out at the same time.

Connect **vcr out** to the composite video input (record) of an NTSC / EIA (PAL / CCIR) compatible VCR. This output must be terminated.

S-VHS In

NOTE: Do NOT connect both s-vhs in and vcr in at the same time. The multiplexer will not function properly.

Connect **s-vhs in** to the S-Video output (play) of an NTSC / EIA (PAL / CCIR) compatible Super VHS video recorder. This input is terminated.

S-VHS Out

NOTE: Do NOT connect both s-vhs out and vcr out at the same time.

Connect **s-vhs out** to the S-Video input (record) of an NTSC / EIA (PAL / CCIR) compatible Super VHS video recorder. This output must be terminated.

Alarm

The **alarms** connector includes pins for mechanical or TTL / CMOS standard alarm inputs, the alarm hold input, motion alarm outputs and the autodetect VCR speed pin. These connections allow the multiplexer to be completely integrated with security systems. See *Chapter 6 — Alarms* for details.

Alarm Inputs

Multiplexer alarm inputs accept a contact type or TTL / CMOS alarm signal. Connect alarm input pins **1** through **16**, to one side of a contact type or TTL / CMOS compatible alarm device. Connect the remaining side of each device to ground (post labeled **gnd** on multiplexer back panel). Multiplexer alarm input polarity is menu selectable and defaults to normally open (NO) or TTL / CMOS active low.

Alarm Hold Input

NOTE: The Alarm Hold Input is not normally used and is only provided for compatibility purposes. Alarm duration control is better managed by the multiplexer. See Alarm Recording Control for more details.

The alarm hold input accepts a normally closed contact type or active high TTL / CMOS alarm signal. Connect **alarms** pin **36** to the alarm hold output of the VCR or other device. Connect the remaining side of the output to ground (post labeled **gnd** on back panel).

Alarm Output

The alarm output is a contact type signal between **alarms** pin **17** (common) and pin **18** (normally closed) or pin **19** (normally open). Connect the appropriate pins to the alarm input of the VCR or other device. See *Appendix D — Technical Specifications* for details.

Motion Alarm Outputs

The motion alarm outputs use a TTL / CMOS type signal. Connect each motion **alarms** pin (pins **20**–**35**) to a TTL / CMOS compatible alarm input on the VCR or other device. Connect the remaining side of the output to ground (post labeled **gnd** on back panel). Motion alarm output polarity is menu selectable and defaults to active high.

Autodetect VCR Speed

Pin **37** connects to the VCR to get the timing signal (it may be named clock or trigger) so the multiplexer can switch to use the same recording speed as the VCR. If the VCR changes the recording speed, the multiplexer will automatically adjust the speed to match. Check your VCR manual to see if the VCR provides a timing signal.

Remote

The two RJ11 connectors are for the multiplexer remote control panel option or remote control commands.

Remote Control Panel Option

Connect the cable provided with the remote control panel to the **remote in** connector. If daisychaining to another multiplexer, connect the **remote out** of this multiplexer to the **remote in** of the next multiplexer in the chain. The remote control panel and the multiplexer front panel operate identically and may be used at the same time. See *Remote Control Panel* manual for details.

SYSTEM CHECKOUT

Multiplexer system operation can be checked immediately after installation with the multiplexer in the factory default state. While the multiplexer itself requires no adjustment, system components such as the monitor, cameras and video recorder should be checked for proper operation and adjustment. The system checkout procedure involves three steps: monitor calibration, camera check, and video recorder check. At least two video cameras are required to check system operation.

Refer to *Figure 1 — Basic Multivision Pro System*. Make certain that all required connections are in place. Apply power to all system equipment.

Monitor Calibration

This process involves adjusting monitor display brightness, contrast, hue and saturation based on the standard color bar pattern generated by the multiplexer. The procedure is as follows.

1. Press **function+zoom**. The first setup menu appears over internally generated color bars (gray bars on B&W units).
2. Turn off any automatic color control features on the monitor that might interfere with manual adjustment (except B&W units).
3. Turn the monitor's color level (saturation) control all the way down. The display is now black and white.
4. Adjust the monitor's contrast and brightness controls so that the bar pattern starts with white, darkens evenly through shades of gray and ends with black.
5. Turn the monitor's color level control to its midpoint (except B&W units).
6. Adjust the monitor's tint (hue) control until the colors are correct. The correct sequence of colors from left to right is white, yellow, cyan, green, magenta, red, blue and black.
7. Press **function+zoom** to exit the setup menu system.

The main monitor is now correctly calibrated to the output of the multiplexer. To calibrate the call monitor, temporarily connect its video cable to the **main mon** output and perform monitor calibration again. While monitor adjustments can be changed to suit the viewer, the above procedure should be performed *before* attempting to adjust cameras or working on display or video quality problems.

Camera Check

The multiplexer multicamera display capability makes checking camera performance as simple as comparing two pictures on one screen. This method is preferable to the direct camera to monitor technique because it allows precise adjustment of each camera against a chosen reference camera. This minimizes differences between cameras, and optimizes picture quality.

NOTE: Before performing a camera check, complete the monitor calibration procedure described in the previous section. Adjusting camera picture quality is more effective on a monitor which is already calibrated.

The camera check procedure is as follows:

1. Complete the monitor calibration procedure.
2. Connect all system cameras directly to the multiplexer camera inputs. Remove all connections to the looping (lower) camera outputs.
3. Make sure that the multiplexer is set up for 75 ohm termination (the default state). The switches on the back panel should be down.
4. Select the format (**2x2**, **3x3** or **4x4**) which displays all of the attached cameras.
5. Pick the best looking picture and use that camera as a reference. If necessary, adjust the camera for an optimum picture. Do NOT adjust the monitor.
6. Adjust each remaining camera, in turn, for an optimum picture. Try to obtain the same picture quality as the reference camera.

The cameras are now correctly adjusted with respect to the calibrated monitor and each other. You may now adjust the monitor for the best overall display. If you choose to make further monitor adjustments, it is best to do so with all cameras displayed.

Making a Test Tape

The easiest way to verify multiplexer system operation is to make a test recording and play it back. This process effectively tests every piece of equipment in the system.

Before proceeding with the test tape, it is recommended that you complete both the monitor calibration and camera check procedures. Make certain that the multiplexer monitor and all system cameras are correctly adjusted. Doing so will help to ensure the best results during the tape test.

The tape test procedure is as follows:

1. Place the VCR in the record mode at the 24-hour speed (this is the multiplexer default VCR record speed and can be changed). The VCR begins recording multiplexed camera video. You may select any viewing mode or display format while recording. Doing so will not affect the tape since camera recording and display are completely independent multiplexer functions.
2. After several minutes, stop the VCR and rewind the tape.
3. Place the VCR in the play mode.
4. Press the **tape** button on the multiplexer.

When the multiplexer detects the encoded VCR signal, it configures itself for tape playback and displays all recorded cameras in the multicamera format. To view one camera full screen, press the corresponding **camera (1–16)** button. To view multiple cameras, press the desired display format (**PIP**, **2x2**, **3x3** or **4x4**) button. If the camera or cameras do not appear, check VCR operation and review all video connections.

This completes the tape test. If it is not successful, repeat the steps outlined above. If you continue to have difficulties, turn to *Appendix C — In Case of Trouble* for assistance.

Chapter 4 — Setup

SETUP MENU SYSTEM

The on-screen menus allow you to set up key features such as system time and date, day and night start times for motion detection, alarm message display, alarm message latch, video loss alarm, audible alarm, alarm input polarity, alarm output polarity, VCR record time, VCR alarm record time, alarm duration, global dwell time, camera titles, motion detection, and system security. All setup data is stored in nonvolatile memory where it is protected against loss due to power failure.

NOTE: To perform multiplexer setup, you must first gain access to the on-screen menu system. Refer to Security Measures in the front of this manual.

Once inside the menu system, multiplexer setup involves three basic operations:

1. Selecting the menu.
2. Positioning the flashing highlight.
3. Setting the option.

Selecting a Menu

Press the **zoom** button to go to the next setup menu. The next menu appears with the flashing highlight at the first option. If you press the **zoom** at the last menu (SECURITY LOCK), the unit exits the setup mode and returns to normal operation.

Positioning the Highlight

Use the left and right arrow buttons to position the menu highlight. Press the **right arrow** to move the highlight to the next character or option. Press the **left arrow** to move the highlight to the previous character or option. When you reach one end of the menu, the highlight appears at the other.

Setting an Option

Press the **up arrow** or **down arrow** to scroll through the available settings or characters:

0–9 A–Z _(represents a space) / : = - + .(period)

When you reach the first or last setting or character, the sequence begins again.

SETUP MENUS

There are eight menus in the setup menu system. The following paragraphs take you through the menu system step-by-step, describing each menu's purpose and options.

Menu 1 — System Time/Date

Menu 1 displays the system time and date (maintained by the multiplexer internal clock/calendar), the product firmware revision number and revision date. By default, the multiplexer displays the time and date at the top of the main monitor. In live mode, it displays the system (current) time and date. In tape mode, it displays the time and date of the recording (encoded on the tape).

You can turn the time/date display off or on at any time by pressing **function+right arrow.**

To set the time and date, use the arrow buttons to position the flashing highlight over each character and set it. Enter the time in HH:MM:SS 24-hour format. Enter the date in MM/DD/YY format (DD.MM.YY format in the PAL version). The clock starts running when you move the highlight into the date field.

NOTE: Be sure to turn off the VCR's time/date display feature. If it is turned on, it may interfere with tape playback. Multicamera display during playback will have time and date over each image and at the top of the screen. If the time/date is too high on the screen, it overlaps the vertical interval.

When finished, press the **zoom** button to go to menu 2 or **function+zoom** to save all changes and leave the setup system.

Menu 2 — Day/Night Start Time

Menu 2 allows you to divide the multiplexer work day into two independent periods, based on start times. If the start times are the same, the day settings will be used for motion detection. Using different start times for day and night allows you to use different motion detection settings for each time span. Motion alarms (ALRM) can be set either **ON** or **OFF**, and SENSE, SIZE and DELAY settings can be different for each time as well.

To set the day start time or night start time, use the **arrow** buttons to position the flashing highlight over each character and set it. Enter the time in HH:MM 24-hour format. In the example below: day is from 8 a.m. to 5 p.m., and night is from 5 p.m. to 8 a.m.

DAY START TIME = 08:00

NIGHT START TIME = 17:00

NOTE: When day and night start times differ, you should set up both motion screens for each camera.

When finished, press the **zoom** button to go to menu 3 or **function+zoom** to save all changes and leave the menu system.

Menu 3 — Toggle Options

Menu 3 allows you to set each menu item to one of two settings. To change a setting, position the highlight over it and press the **up** or **down arrow.** The alternate setting appears. To move to the next toggle option, press the **right arrow**; to go back to the previous toggle option, press the **left arrow.** The toggle options include the following:

Alarm Message Display

The ALARM MESSAGE DISPLAY option controls the ALARM or VIDLOSS graphic. It toggles as follows:

ON — The multiplexer displays the ALARM or VIDLOSS graphic on both the main and call monitors. The multiplexer also switches to multicamera display on the main monitor to show all cameras with alarms.

OFF — The ALARM or VIDLOSS graphic does not display on the main monitor, it only displays on the call monitor. The multiplexer does not change the display on the main monitor.

The default ALARM MESSAGE DISPLAY setting is **ON**.

Alarm Message Latch

The ALARM MESSAGE LATCH option determines how long the ALARM and VIDLOSS (video loss) messages remain on screen. It toggles as follows:

ON — ALARM messages remain on screen until you press **function** to clear them. Pressing **function** removes all video loss messages and messages for expired alarm events. Messages for current alarm events remain on screen.

NOTE: If video is not restored before the VIDLOSS message is cleared, the monitor displays the last image received until the display format changes or video is restored.

OFF — Each message remains on screen until the ALARM DURATION time expires (the default is 4 seconds) or the corresponding alarm event clears.

The default ALARM MESSAGE LATCH setting is **OFF.**

Video Loss Alarm

The VIDEO LOSS ALARM option controls the multiplexer video loss detection feature. It toggles as follows:

ON — The multiplexer responds to camera video loss as an alarm event and displays the message VIDLOSS in place of the camera's picture on both monitors. If ALARM MESSAGE DISPLAY is set **OFF**, the message only displays on the call monitor. The ALARM COUNTER counts a video loss as an alarm for that camera input.

OFF — Camera video loss is not treated as an alarm event, and a VIDLOSS message is not displayed on either monitor. The ALARM COUNTER does not count the video loss as an alarm. The only sign of video loss is that the monitor displays the last image received from that camera until you change the display format, when a blank window with the camera number displays. Refer to *Video Loss Alarms* for more details.

The default VIDEO LOSS ALARM setting is **ON**.

Audible Alarm

The AUDIBLE ALARM option controls the multiplexer alarm tone. It toggles as follows:

ON — The multiplexer sounds an alarm tone when it detects a mechanical alarm, motion alarm or video loss. Press any button to turn the alarm tone off.

OFF — The multiplexer is silent when it detects a mechanical alarm, motion alarm or video loss.

The default AUDIBLE ALARM setting is **OFF**.

Alarm Input Polarity

The ALARM INPUT POLARITY option allows you to set the polarity of all multiplexer alarm inputs. It toggles as follows:

ACT LOW — Active alarm inputs are "low". The multiplexer recognizes a contact closure or TTL/CMOS logic low as an alarm event.

ACT HI — Active alarm inputs are "high". The multiplexer recognizes a contact opening or TTL/CMOS logic high as an alarm event.

The default ALARM INPUT POLARITY setting is **ACT LOW**.

Alarm Output Polarity

The ALARM OUTPUT POLARITY option allows you to set the active polarity of the TTL/CMOS alarm signal for pins **20**–**35** (motion outputs 1–16) on the **alarms** connector. It toggles as follows:

ACT LOW — The alarm output signal goes "low" when a motion alarm occurs or for an alarm input or vidloss when PASS-THRU EXTRNL ALRMS is set to **YES**.

ACT HI — The alarm output signal goes "high" when a motion alarm occurs.

NOTE: The duration of the alarm output signal is determined by the Alarm Duration setting.

The default ALARM OUTPUT POLARITY setting is **ACT LOW**.

Pass-Thru Extrnl Alrms

This menu option lets you loop (pass-thru) the external alarm inputs to the alarm outputs.

YES — Alarm outputs represent all alarms for a particular camera; motion alarms, mechanical alarms and video loss alarms.

NO — Alarm outputs are for motion alarms only. External alarms are not included (not passed-thru).

The default PASS-THRU EXTRNL ALRMS setting is **YES**.

Image Tenderizer

This option reduces the shakiness and jitter associated with high resolution compressed multicamera images.

ON — Uses the special filtering circuit when the multiplexer displays a multicamera image on the main monitor.

OFF — Turns off the special filtering circuit.

The default IMAGE TENDERIZER setting is **ON**.

When finished, press the **zoom** button to go to menu 4 or press **function+zoom** to save all changes and leave the setup system.

Menu 4 — VCR Record Time

Menu 4 allows you to enter the VCR's normal and alarm recording speeds. With autodetect VCR speed, these settings are used if that signal is lost. Use the **up** and **down arrow** buttons to set each speed as follows:

VCR RECORD TIME — The VCR's normal (nonalarm) operating speed (**2**—**999** hours).

The default VCR RECORD TIME is **024 HRS**.

VCR ALARM RECORD TIME — The VCR's recording speed for alarms (**2**—**999** hours).

The default VCR ALARM RECORD TIME is **002 HRS**.

NOTE: If the multiplexer alarm output is not connected to the VCR's alarm input, the VCR RECORD TIME and the VCR ALARM RECORD TIME should be set to the same value.

When finished, press the **zoom** button to go to menu 5 or **function+zoom** to save all changes and leave the setup system.

Menu 5 — Alarm Duration

Menu 5 allows you to set the minimum multiplexer alarm time. The ALARM DURATION setting determines how many seconds the multiplexer remains in the alarm state after an alarm event occurs.

Set the ALARM DURATION time using the **up** and **down arrow** buttons. You may use any setting between **2** and **999** seconds.

The default ALARM DURATION setting is **4** seconds.

When finished, press the **zoom** button to go to menu 6 or **function+zoom** to save all changes and leave the setup system.

Menu 6 — Global Dwell

The GLOBAL DWELL setting determines the rate at which the multiplexer sequences cameras on the main monitor (either full screen or in the lower right window) when **sequence** is selected. It also determines the rate at which the call monitor switches cameras during multiple alarm events.

Set the GLOBAL DWELL time in seconds using the **up** and **down arrow** buttons. You may enter any setting between **1** and **99** seconds. This setting applies to all cameras.

NOTE: The Global Dwell setting affects on-screen camera display only. It does NOT affect the rate at which the multiplexer sends images to the VCR.

The default GLOBAL DWELL time is **2** seconds.

When finished, press the **zoom** button to go to menu 7 or **function+zoom** to save all changes and leave the menu system.

Menu 7 — Camera Titles

Menu 7 allows you to assign a title to each camera input. It also provides access to the MOTION SETUP screens described below.

Initially each title is the camera's number. To change a title, use the **arrow** buttons to position the flashing highlight and select characters. A title can contain up to 10 characters selected from the following:

0–9 A–Z _(represents a space) / : = - + .(period)

When you are finished setting a title, do one of the following:

- press **function** to display the DAY MOTION SETUP screen (described below) for the current camera.
- press **zoom** to set the next camera title, or press a specific **camera (1–16)** button to set that camera title.
- press **function+zoom** to save all changes and leave the setup system. Press **function+zoom** again if the first press does not get you out of the menu setup system.

Motion Setup Screen

To access the motion setup screen, press **function** while the Camera Titles menu is displayed. The day motion screen appears. Press **function** again to view the night motion setup screen for that camera. Each screen displays the current camera picture overlaid with the motion targets, camera number, motion setup options and help text. You can adjust whether motion detection (ALRM) is **ON** or **OFF**, sensitivity (SENSE), object size (SIZE), DELAY and turn targets on or off on the motion setup screen. The default multiplexer motion setup screen looks like this:

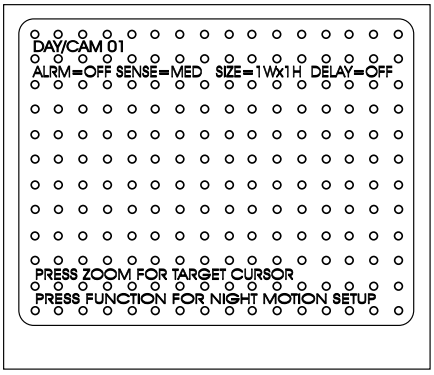

Figure 7 — Motion Setup Screen

The highlight is initially positioned at the first option. You can:

- use the **arrow** buttons to select and set motion detection options.
- press **zoom** to display the target cursor and select motion targets.
- press **function** to display the night motion setup screen.

Motion Options

The Day and Night Motion Setup screens display a status line containing the four multiplexer motion detection options. Use the **arrow** buttons to position the flashing highlight on each option and choose the value that best suits your needs. If the highlight is not visible, press **zoom** to activate it. Option setting applies only to the time period covered by the screen (determined by the current DAY START TIME and NIGHT START TIME settings).

ALRM (Alarm)

The alarm option selects the motion alarm operating mode for the current camera.

NOTE: Cameras with ALRM set to OFF still function as activity detectors. Active cameras are given recording priority, but motion alarms are NOT triggered.

OFF — The multiplexer does not initiate a motion alarm when it detects activity at this camera.

TST — Select this setting to test the current motion setup. When it detects motion, the multiplexer freezes the scene and marks all triggered targets with an X. This helps you see the effects of changing which targets are on, and which are off, and the effects of different SENSE, SIZE or DELAY settings. To repeat the test, press **right arrow**. To cancel the test, press **left arrow**.

NOTE: After cancelling the test, the ALRM setting returns to OFF (the default). Make sure you change the setting to ON or AND if you want either type of alarm.

AND — The multiplexer initiates a motion alarm only when it detects both activity *and* a contact alarm at this camera.

ON — The multiplexer initiates a motion alarm when it detects activity at this camera.

The default alarm option setting is **OFF**.

SENSE (Sensitivity) The SENSE option is based on the degree of contrast between the moving object and background for the current camera. The motion test can help you pick the most effective SENSE setting. It toggles as follows:

XLO — Extra low sensitivity.

LO — Low sensitivity.

MED — Medium sensitivity.

HI — High sensitivity.

XHI — Extra high sensitivity.

The default sensitivity setting is **MED**.

SIZE The SIZE option determines the minimum object size detected at the current camera. You set the object size by selecting its height and width in "targets". For example, a 2Wx4H setting is an object two targets wide and four targets high. A 1Wx1H object is a single target. The largest possible object setting is 9Wx9H. A smaller object size makes motion detection more likely, and a larger size means fewer objects will be large enough to trigger a motion alarm.

To set the object size, use the **arrow** buttons to move the flashing highlight to W (width) or H (height). Use the **up** and **down arrow** buttons to set the value (1–9).

NOTE: To be detected, an object must trigger at least one row and one column of targets covered by the SIZE setting. For example, a 2Wx5H setting requires an object to trigger at least 2 targets horizontally and 5 targets vertically within a 2Wx5H active target area. The object may trigger additional targets.

The default SIZE setting is **1Wx1H**.

DELAY

The DELAY option determines how long the multiplexer must detect motion at the current camera before initiating a motion alarm. Motion of shorter duration does not trigger a motion alarm. DELAY is useful in preventing sudden changes (like those caused by lights or shadows) from triggering a motion alarm. The DELAY setting has no affect on activity detection (priority-based camera recording).

To set the DELAY in seconds, use the **arrow** buttons to move the flashing highlight to the DELAY option and select a value: **OFF**, **0.5S**, **1SEC**, **1.5S**, **2SEC**, **3SEC** or **5SEC**.

The default DELAY option setting is **OFF**.

Working with Motion Targets

The targets on each motion setup screen can be turned on or off individually, by row or by screen. Active targets are circled (this is the default). Inactive targets are not circled. To set up targets, use the following front panel buttons:

zoom — turns the target cursor on or off.

up arrow — moves the target cursor up one row at a time.

down arrow — moves the target cursor down one row at a time.

left arrow — moves the target cursor to the left (4 and 9-camera models only).

right arrow — moves the target cursor to the right (4 and 9-camera models only).

live — turns all targets in the current row ON.

tape — turns all targets in the current row OFF.

sequence — turns all targets on the screen ON.

call — turns all targets on the screen OFF.

camera (1–16) — toggles the corresponding target on the cursor line off or on. Move left or right (16-camera models only) by pressing camera buttons to the left or right of the current target.

function — saves current motion target setting and displays the next screen.

Use the buttons to make sure targets are active (circled) where motion is to be detected. When you finish, press the **function** button to save the target setting and display the next screen.

A motion bar appears at the top center of the motion setup screen when the multiplexer detects motion. You can see the effect of your motion settings by watching the motion bar during setup.

When finished with motion setup, press **function** to return to the camera titles menu. Then press **zoom** to go to menu 8 or press **function+zoom** to save all changes and leave the menu system. (Press **function+zoom** again if necessary.)

Menu 8 — Security Lock

Menu 8 controls the multiplexer front panel security lock feature. When this feature is on, the multiplexer locks all front panel buttons except those required to re-enter the setup mode. Press the **up** or **down arrow** button to change this option. The new security lock setting takes effect when you exit the setup system.

When you finish, press the **zoom** button or **function+zoom** to save all changes and leave the setup system.

Chapter 5 — Operation

The multiplexer is flexible and very easy to use. No setup is required to use the basic features, yet the product can be adapted to meet the display and recording requirements of most multicamera security systems.

This section describes how to operate the multiplexer. It is organized by operating task and product feature.

The multiplexer has three basic operating modes: live, tape and setup.

LIVE MODE

Press the **live** button to view live camera video. Live mode allows you to view any combination of connected cameras on the main monitor in any display format. The call monitor displays either one selected camera full screen, or displays full screen images from cameras with alarms. Live camera viewing does not affect camera video output to the VCR. Recording camera video via the multiplexer **vcr out** connector is completely independent and is not affected by operator actions at the front panel.

The live multicamera display updates a new camera every 1/60 of a second (PAL every 1/50 of a second). The final update rate for each camera depends on how many cameras are displayed and whether the camera has activity. Live updates are weighted according to activity much like updates sent to the VCR.

TAPE MODE

Tape mode allows you to view the video recorded by the VCR. If you only have one VCR connected, recording stops while you review a tape. The call monitor is the only source of live images. The call monitor displays either one selected camera full screen, or full screen images from any cameras with alarms.

To view what has been recorded, place the VCR in the play mode and press the **tape** button on the multiplexer. When the multiplexer detects the encoded video signal, it starts tape playback and displays all recorded cameras in the multicamera format. To view one camera in the full screen format, press the corresponding **camera** button. To view multiple cameras, press the appropriate format button (**PIP**, **2x2**, **3x3** or **4x4**). Cameras may be displayed in any order in any of the available views.

The multiplexer detects recorded alarm events during tape playback by monitoring the VIS information returned from tape. Each field of recorded video is encoded with alarm status information, camera number, camera title, time and date. The multiplexer uses this information to identify camera related alarm events.

When the multiplexer detects an alarm event on tape, it displays that camera image overlaid with an alarm message. Recorded alarms do not interfere with the detection of mechanical alarms, so the multiplexer can process both types of alarm event at the same time. The front panel LEDs blink for cameras with recorded alarms, but not for live motion or mechanical alarms. Live alarm images only display on the call monitor since the main monitor is used for tape playback. See *Recorded Alarms* for details.

Tape Playback With Two VCRs

Tape mode allows you to view previously recorded video from the first VCR. It does not affect camera video output to the second VCR for recording. Recording of camera video at the multiplexer **vcr out** connector is a completely independent operation. This allows full duplex operation with two VCRs connected to the multiplexer. Without this capability, camera video recording must stop while a previously recorded tape is viewed. See *Simultaneous Record and Play* for details.

Tape Preview

To view what is being sent to the VCR, place the VCR in any mode other than playback and press the **tape** button on the multiplexer. The **live** and **tape** lights indicate that the multiplexer is displaying encoded video — full screen camera pictures sequenced in camera number order at the rate set on the VCR RECORD TIME menu.

SETUP MODE

Setup mode allows you to customize multiplexer operation to suit a specific application. To enter the setup mode, press the buttons required to access system setup menus (see *Security Measures* in the front of this manual for instructions). See *Chapter 4 — Setup* for a description of the setup menu system.

Viewing One Camera

Main Monitor

The main monitor can display any live or recorded camera in the full screen format. It can also display a movable 2x zoom of any camera.

Full Screen

Press any **camera (1–16)** button when the **call** light is not lit. The multiplexer displays the selected camera full screen. You can also press the **full screen** button to switch to the full screen format. The main monitor displays the last camera selected in this format.

The 2x Zoom

Press the **zoom** button while viewing full screen to zoom the main monitor display. The multiplexer displays a 2x zoom picture with a zoom window insert.

The zoom window contains a one quarter sized view of the current camera, overlaid with a movable zoom pointer. The pointer marks the part of the picture on display.

Zoom Control

1. Display the desired camera in the full screen format.
2. Press the **zoom** button to display the zoom window.
3. Press the **up**, **down**, **left** and **right arrow** buttons to move the zoom pointer. The multiplexer moves the 2x display accordingly.

To move diagonally, press the **up** or **down arrow** button and the **right** or **left arrow** button simultaneously; for example, press the **up arrow** button and the **left arrow** button to move the zoom window diagonally to the upper left of the display.

The zoom window disappears two seconds after the last button press to provide a clear view. Press any **arrow** button to recall it.

To return to the full screen format, press the **zoom** button again or press any **camera** button.

The multiplexer remembers the selected camera and the position of the zoom window between zoom operations.

Call Monitor

The call monitor can display any live camera in the full screen format. To select a camera for display on the call monitor:

1. Press the **call** button. The **call** light comes on, indicating the multiplexer is in the call select mode. If the light does not come on, the multiplexer is in the main select mode. Press **call** again to start over.
2. Press any **camera** button. The call monitor displays the selected camera.

To exit the call select mode, press the **call** button. The multiplexer resumes normal operation.

Viewing Multiple Cameras

The main monitor displays multiple cameras in any available format: Picture-In-Picture (PIP), 2x2, 3x3 (9 and 16-camera models only) and 4x4 (16-camera models only). Compose each format by selecting the cameras and their location on screen.

Cameras not already displayed can be sequenced in the lower right window of any multiple camera format. See *Sequencing Cameras* for details.

Picture in Picture (PIP)

The Picture-In-Picture format displays a full screen "background" picture with a 1/16 size picture "insert." A camera can be selected for display and can be swapped instantly between the background and the insert. The insert can also be sequenced.

1. Press the **PIP** button. The multiplexer displays the current camera and the last selected PIP insert camera.
2. Press the **camera (1–16)** button for the desired PIP insert camera. The selected camera appears full screen.
3. Press the **PIP** button again. The multiplexer swaps the two cameras and puts the selected camera in the PIP insert.
4. Press the **camera (1–16)** button to view full screen.

You can swap the background and insert cameras at any time by pressing the **PIP** button.

The multiplexer remembers the PIP camera selection and recalls it the next time the PIP format is displayed.

2x2 Format

The 2x2 format is the familiar quad display. It displays four pictures at one time. Any camera can be selected for display in any window. Cameras not already displayed can be sequenced in the lower right window.

Press and hold the **2x2** button. The multiplexer displays the 2x2 format with the cameras last selected for 2x2 display.

While holding the **2x2** button, press the **camera (1–16)** button for the upper left window on the monitor (window #1). Continue pressing **camera** buttons until each window contains the desired camera. Release the **2x2** button when you have finished selecting cameras.

The multiplexer remembers the 2x2 camera selection and recalls it the next time the 2x2 format is displayed.

3x3 Format (9 and 16-camera models only)

The 3x3 format displays nine pictures at one time. Any camera can be selected for display in any window. Cameras not already displayed can be sequenced in the lower right window.

Press and hold the **3x3** button. The multiplexer displays the 3x3 format with the cameras last selected for 3x3 display.

While holding the **3x3** button, press the **camera** button you want displayed in the upper left (window #1). Continue pressing **camera** buttons until each window contains the desired camera. Release the **3x3** button when you have finished selecting cameras.

The multiplexer remembers the 3x3 camera selection and recalls it the next time the 3x3 format is displayed.

4x4 Format (16-camera models only)

The 4x4 format displays 16 pictures at one time. Any camera can be selected for display in any of the 16 windows.

Press the **4x4** button. The multiplexer displays the 4x4 format showing all the cameras in the previously selected order.

While holding the **4x4** button, press the **camera** button for the camera desired in window #1. Continue pressing **camera** buttons until each window contains the desired camera. Release the **4x4** button when you have finished selecting cameras.

The multiplexer remembers the 4x4 camera selection and recalls it the next time the 4x4 format is displayed.

Sequencing Cameras

The multiplexer allows sequential display of cameras on the main monitor in any available format. In the Full Screen format, all cameras can be sequenced full screen. In multicamera formats, cameras not already displayed can be sequenced in the lower right window. Cameras sequence in camera number order at a rate determined by the GLOBAL DWELL setting (see *Chapter 4 — Setup*).

To start camera sequencing:

1. Select the desired format.
2. Press the **sequence** button. The **sequence** light comes on and the multiplexer switches cameras in the lower right window of the display (or full screen) at the current Global Dwell rate.

To stop camera sequencing:

Press the **sequence** button again. The **sequence** light goes out. Sequencing stops with the current camera displayed in the lower right window (or full screen).

Videotape Operations

The multiplexer allows recording of multiple cameras onto a single videotape. This encoding function is performed in the background and does not interfere with other operations. All multiplexer features remain available while recording. If two VCRs are connected, tape playback does not affect recording. It is possible to review a previously recorded tape while recording continues on a second VCR. See *Simultaneous Record and Play* for details.

VCR Setup

For optimum tape recording and playback, the multiplexer must be correctly set up for use with the VCR. This is done by changing settings in the setup menu system.

Two setup options affect camera recording:

- VCR RECORD TIME
- VCR ALARM RECORD TIME

Refer to *Chapter 4 — Setup* for a description of these VCR menu options and their use.

Autodetect VCR Speed

If pin **37** on the **alarms** connector is connected to the VCR for the timing signal (it may be named clock or trigger) the multiplexer switches to the same recording speed as the VCR. Not all VCRs send a signal when switching to an alarm recording rate. See your VCR manual for details about whether this feature is supported by your VCR. If the VCR does NOT send a signal, be sure you enter the settings you want in the multiplexer menu for VCR RECORD TIME and VCR ALARM RECORD TIME.

Tape Recording

Refer to *Figure 1 — Basic Multivision Pro System*. Make certain that the video input of the VCR is connected to the **vcr out** or **s-vhs out** connector on the multiplexer.

Multicamera Recording

Multiple camera recording involves simply placing the VCR in record mode. All cameras connected to the multiplexer are encoded on tape. No action is required at the multiplexer.

NOTE: Several factors affect the order and rate at which cameras are recorded. These include the number of connected cameras, the number of cameras with motion, and the number of alarms generated during recording.

One Camera Recording

The multiplexer can be directed to record a single "priority" camera exclusively. This feature can be turned on or off at any time.

To start one camera recording:

1. Press and hold the **1 cam** (**function**) button.
2. Press the **camera (1–16)** button for the camera to be recorded. The indicator light above that camera button comes on. The multiplexer displays the selected camera on the main monitor and flashes the **1 cam** light to indicate that the system is in one camera record mode.

To end one camera recording:

1. Press and hold the **1 cam** button.
2. Press the **live** button.

The **1 cam** light stops flashing and the multiplexer resumes multicamera recording.

NOTE: When the 1 CAM light is flashing, only the selected camera is recorded. You must end one camera recording to resume recording all cameras.

Tape Playback

To review a videotape with the multiplexer, press the **tape** button and place the VCR in the play mode. The multiplexer decodes the recorded video signal and displays it in the current format. Cameras appear in the order they were recorded.

Multiplexer operation during videotape playback is the same as when viewing live cameras. All front panel buttons have the same effect. The difference is that the VCR is the source of video.

VCR Special Effects

Most special video playback features can be used while reviewing a multiplexer recording. Field-oriented features such as field advance or still field should work, provided the VCR reproduces each video field accurately.

Chapter 6 — Alarms

This chapter describes how the multiplexer responds to alarms and what can be done when an alarm occurs.

The multiplexer detects and responds to four types of alarm events: mechanical alarms, motion alarms, recorded alarms and video loss. A mechanical alarm occurs when there is a contact closure at any multiplexer alarm input. A motion alarm occurs when motion is detected at a camera with motion detection (ALRM) **ON**. A recorded alarm occurs when the multiplexer detects an "alarm" encoded field during tape playback. A video loss alarm occurs when the multiplexer detects video loss at an active camera input.

MECHANICAL ALARMS

The **alarms** connector provides one mechanical alarm input for each camera input. These inputs connect to any security device equipped with either a contact closure or TTL/CMOS standard alarm output. Each alarm input requires two wires. One wire connects to the desired alarm input pin. The second wire connects to the multiplexer ground post (**gnd**). See *Table 1 — Alarm Connector Pin Assignments* for details. Alarm polarity is selectable via multiplexer setup menus. See *Menu 3 — Toggle Options* for details.

The multiplexer always responds to mechanical alarms. The type of alarm response depends upon whether it is in live or tape mode.

MOTION ALARMS

The multiplexer can initiate an alarm when motion is detected at a camera if this feature is selected during setup. Motion alarms can be turned **ON** or **OFF** for each camera using the motion setup screen in the camera titles menu. For motion alarms, set the ALRM option to **ON** for each camera and time period you want (see *Motion Setup Screen* for details). If you want an alarm only when you have both a mechanical alarm and motion for a particular camera, set the ALRM option to **AND.** The multiplexer initiates a motion alarm when a predetermined number or arrangement of targets are triggered. Each of the 192 targets is sensitive to changes in picture content.

When a motion alarm occurs, the multiplexer alerts the operator, displays the alarm camera, toggles TTL / CMOS and contact alarm outputs and sends images to the VCR on a priority basis. Multiplexer response to motion alarms is similar to mechanical alarms and depends on whether it is in live or tape mode when the alarm occurs.

Motion Alarm Status Table

The MOTION ALARM STATUS TABLE displays the current day and night motion alarm option settings for each camera. In the example below, camera 5 is set for motion alarms between 8 a.m. and 5 p.m. for objects at least 2 targets wide by 3 targets high. Motion alarms will not be generated for camera 5 between 5 p.m. and 8 a.m.

The table allows you to quickly review the motion alarm settings for the multiplexer. To view the table during normal operation (outside the menu system), press **function+down arrow**. The table appears (over the color bars) as shown below.

The MOTION ALARM STATUS TABLE has two pages. Each page displays the Day and Night option settings of eight cameras (01 through 08 or 09 through 16). Press **call** to toggle between the pages.

The MOTION ALARM STATUS TABLE is for display only. You cannot change multiplexer motion option settings using this screen. To make changes, press **live** to exit the table and get into the setup menu system to change settings.

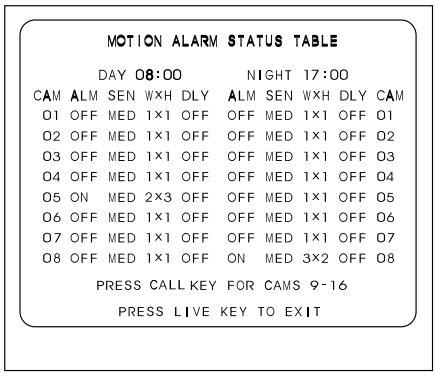
MOTION ALARM STATUS TABLE
DAY 08:00 NIGHT 17:00
CAM ALM SEN WXH DLY ALM SEN WXH DLY CAM
01 OFF MED 1X1 OFF OFF MED 1X1 OFF 01
02 OFF MED 1X1 OFF OFF MED 1X1 OFF 02
03 OFF MED 1X1 OFF OFF MED 1X1 OFF 03
04 OFF MED 1X1 OFF OFF MED 1X1 OFF 04
05 ON MED 2X3 OFF OFF MED 1X1 OFF 05
06 OFF MED 1X1 OFF OFF MED 1X1 OFF 06
07 OFF MED 1X1 OFF OFF MED 1X1 OFF 07
08 OFF MED 1X1 OFF ON MED 3X2 OFF 08
PRESS CALL KEY FOR CAMS 9-16
PRESS LIVE KEY TO EXIT

Figure 8 — Motion Alarm Status Table

Alarm Counter

The multiplexer counts the number of mechanical alarm events that occur at each camera input. The ALARM COUNTER maintains a total count for each camera until the ALARM COUNT is cleared.

Motion alarms are counted for any cameras with the ALRM option **ON.** If during motion setup you set the ALRM option to **AND**, an alarm is generated only when motion and a mechanical alarm happen at the same time for that camera. If the menu option for VIDEO LOSS ALARM is set **ON**, video loss alarms are included in the ALARM COUNT. If set to **OFF**, video loss is not counted as an alarm.

To view these totals during normal operation, press **function+left arrow**. The count updates if an alarm occurs with the alarm counter on screen. The multiplexer displays the alarm count for each camera input and the time and date the count was last cleared.

Press **live** to exit the ALARM COUNTER. The multiplexer removes the ALARM COUNT from the screen and resumes normal operation. Alarm counts are NOT cleared and alarm counting continues.

Press **call** to clear the ALARM COUNTER. The multiplexer resets the ALARM COUNT (all counts return to 000) and updates the ALARM COUNT SINCE date and time. Counting alarms begins immediately.

Alarm counting stops at 999. That count remains until cleared.

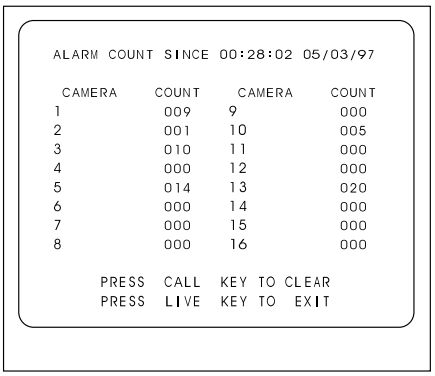

Figure 9 — Alarm Counter

Live Mode Alarm Response

When a mechanical and/or motion alarm occurs in the live mode, the multiplexer alerts the operator and performs tasks required to record the alarm event on videotape.

When it detects the initial alarm in live mode, the multiplexer does the following:

1. Flashes the associated **camera (1–16)** light.
2. Sounds the audible alarm (if **ON** in setup menu).
3. Toggles the alarm relay.
4. Activates the alarm output (only motion alarms unless PASS-THRU EXTRNL ALRMS is **YES**).
5. Displays the alarm camera on the call monitor, overlaid with the ALARM message.
6. Switches the main monitor to the highest multicamera format if the alarm camera is not already on display (unless the ALARM MESSAGE DISPLAY option is set to **OFF**).
7. Overlays the alarm camera on the main monitor with the ALARM message (unless the ALARM MESSAGE DISPLAY option is set to **OFF**).
8. Switches to the VCR ALARM RECORD TIME encoding rate.
9. Encodes the camera as “alarm” and sends it to the VCR on a priority basis.

The multiplexer remains in the alarm state until ALL of the following occur:

- All contact alarms are released.
- No motion is detected at cameras set for motion alarm.
- The ALARM DURATION time elapses.
- The alarm hold input is released.

Multiple alarms are processed in the order they occur.

Tape Mode Live Alarm Response

When a mechanical and/or motion alarm occurs in the tape mode, the multiplexer processes the event in the background. If two VCRs are connected, it records the alarm event on videotape but does not indicate the alarm to the user. This allows alarm recording during tape playback. See *Simultaneous Record and Play*.

When the multiplexer detects the initial live alarm in tape mode, it does the following:

1. Toggles the alarm relay.
2. Activates the alarm output (motion alarms only unless PASS-THRU EXTRNL ALRMS is **YES**).
3. Switches to the VCR ALARM RECORD TIME encoding rate.
4. Encodes the camera as "alarm" and sends it to the VCR on a priority basis.

The multiplexer remains in the alarm state until ALL of the following occur:

- All mechanical alarms are released.
- No motion detected at cameras set for motion alarms.
- The ALARM DURATION time elapses.
- The alarm hold input is released.

Multiple alarms are processed in the order they occur.

RECORDED ALARMS

The multiplexer detects recorded alarm events by monitoring the VIS information returned from tape. Each field of recorded video is encoded with alarm status information, camera number, camera title, time and date. The multiplexer uses this information to identify camera related alarm events.

The multiplexer must be in tape mode to display and process recorded alarms. The processing of recorded alarms is completely independent from live alarm processing. The multiplexer can perform both tasks at the same time. In tape mode, live alarm events process in the background and display on the call monitor.

The multiplexer does the following when it detects a recorded alarm while in tape mode:

- Flashes the associated **camera (1–16)** light.
- Overlays the alarm camera with the ALARM message on the main monitor.

The multiplexer remains in the alarm state until both of the following occur:

- The recorded alarm event ends.
- The ALARM DURATION time elapses (the default is 4 seconds).

Multiple alarms are processed in the order in which they occur. The multiplexer detects recorded alarm events at any playback speed (including forward and reverse search on many VCRs). When a tape plays at the speed it was recorded, the duration of each alarm is the same as the original event. Other tape speeds slow down or speed up alarm playback; however the default alarm time remains 4 seconds.

VIDEO LOSS ALARMS

The multiplexer detects loss of video at any connected camera input by monitoring the camera's video sync signal. The VIDEO LOSS ALARM option controls this feature. When this option is **ON** (the default), the multiplexer responds to loss of camera video by alerting the operator and recording the alarm event on videotape. When the VIDEO LOSS ALARM option is **OFF**, video loss is NOT treated as an alarm, and no message displays.

The multiplexer does the following when it detects loss of camera video:

1. Flashes the associated **camera (1–16)** light.
2. Toggles the alarm relay.
3. Switches the call monitor to the lost camera input and displays the VIDLOSS message.
4. Switches the main monitor to the multicamera format (if ALARM MESSAGE DISPLAY is **ON** and the alarm camera is not already displayed) and displays the VIDLOSS message.
5. Switches to the VCR ALARM RECORD TIME encoding rate.
6. Encodes the camera as "video lost" and sends it to the VCR.

Multiple video loss alarms are processed in the order they occur.

The multiplexer remains in the alarm state until ALL of the following occur:

- The ALARM DURATION time elapses.
- The alarm hold input is released.

Chapter 7 — Special Applications

The features and flexibility of the multiplexer make it a powerful tool in special applications where unique capabilities are required. This section describes several ways to use the multiplexer.

SIMULTANEOUS RECORD AND PLAY

The multiplexer circuits simultaneously encode and decode video. This is referred to as "full duplex" operation, which uses two VCRs. The unit can encode camera video to one VCR while it decodes and displays video played on a second VCR. The two operations do not interfere with each other. Without this capability, camera video recording must stop while a previously recorded tape is viewed.

Full duplex capability is most important in applications that demand continuous video recording of multiple cameras. It allows an operator equipped with a second video recorder to review multiplexer tapes without interrupting the recording process.

Refer to *Figure 2 — Multiplexer System with Two VCRs*. To add a second VCR to a standard multiplexer installation:

1. Connect a cable to "video in" on the VCR and connect the other end of this cable to the multiplexer **vcr out** connector. This VCR is now dedicated for tape recording.

2. Connect another cable to the "video out" of the second VCR and the multiplexer **vcr in** connector. This VCR is now dedicated for tape playback.

Multiplexer operation is similar when connected to two VCRs. The difference is that recording and playback are performed by separate VCRs.

MULTIPLEXED VIDEO TRANSMISSION

Two multiplexers can be employed to transmit video from multiple cameras over a single video communication link. The link may be coaxial cable, a microwave channel, or any other medium that supports real-time video. Where two communications links are available, simultaneous two-way video communication is possible. Multiplexed video transmission requires that one multiplexer be installed at each location. See *Figure 3 — One-Way Multiplexed Video Transmission*, for details.

A multiplexed video link allows users at one or both ends to display local or remote cameras. Multiplexer operation is normal except that you press **function+tape** to display the remote cameras.

One-Way Video Transmission

One-way multiplexed video transmission requires two multiplexers and one video quality communication link. The link joins the **vcr out** connector at Site A to the **vcr in** connector at Site B. Both Site A and Site B can view the cameras located at Site A. Site B can view either local cameras (press **live**) or the cameras located at Site A (press **function+tape**).

Two-Way Video Transmission

Two-way multiplexed video transmission requires two multiplexers and two video quality communication links. The communication links cross connect the multiplexer VCR connectors at these sites: **vcr out** at Site A connects to **vcr in** at Site B and vice versa. Both sites can view either local cameras (press **live**) or the cameras located at the other site (press **function+ tape**).

To establish a multiplexed video transmission link:

1. Connect two multiplexer units as described above.
2. Set VCR RECORD TIME on both multiplexer units to **001 HRS** for NTSC/EIA units or **002 HRS** for PAL/CCIR.
3. Press **function+tape** on each multiplexer. The multiplexer enters the video transmission mode and displays all remote cameras.

If you get a MISSING TAPE INPUT message, check the connections and make sure that **vcr in** is connected to **vcr out** on the other unit. Once the link is established, press the **live** button to view local cameras, or press **function+tape** to view remote cameras.

APPENDIX A ALARM CONNECTOR PIN ASSIGNMENTS

The **alarms** connector is a DB37-S. It accepts a DB37-P mating connector.

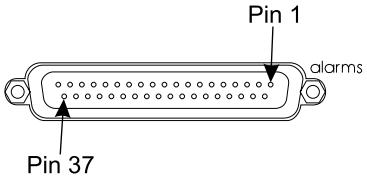

Figure 10 — Alarm Connector

PIN	PIN ASSIGNMENT	PIN	PIN ASSIGNMENT
1	Alarm input 1	20	Alarm output 1
2	Alarm input 2	21	Alarm output 2
3	Alarm input 3	22	Alarm output 3
4	Alarm input 4	23	Alarm output 4
5	Alarm input 5	24	Alarm output 5
6	Alarm input 6	25	Alarm output 6
7	Alarm input 7	26	Alarm output 7
8	Alarm input 8	27	Alarm output 8
9	Alarm input 9	28	Alarm output 9
10	Alarm input 10	29	Alarm output 10
11	Alarm input 11	30	Alarm output 11
12	Alarm input 12	31	Alarm output 12
13	Alarm input 13	32	Alarm output 13
14	Alarm input 14	33	Alarm output 14
15	Alarm input 15	34	Alarm output 15
16	Alarm input 16	35	Alarm output 16
17	Alarm output com	36	Alarm hold input
18	Alarm output NC	37	Autodetect VCR Speed
19	Alarm output NO		

Table 1 — Alarm Connector Pin Assignments

APPENDIX B ALARM RECORDING CONTROL

Most multiplexer installations require that alarm events be documented on videotape. The multiplexer provides all of the necessary connectors and signals to accomplish this and is flexible enough to satisfy most video documentation requirements.

A multiplexer alarm event begins when the unit detects an alarm signal at the **alarms** connector, or motion at a camera set up for motion alarms. The sequence of events following alarm detection is determined by one or more of the following:

- Multiplexer option settings.
- VCR programming.
- Connections between the multiplexer and the VCR.

Uncontrolled Alarm Recording

When alarm recording is not controlled, the VCR records alarm cameras as normal video. Recorder operation is not affected by alarm events. The VCR simply records alarm video output by the multiplexer at the set time-lapse speed. Uncontrolled alarm recording requires only video connections between the multiplexer and the VCR. Alarm connections at the VCR are not required.

To set up the system for uncontrolled alarm recording:

- Connect the multiplexer **vcr in** and **vcr out** connectors to the VCR's video output and video input respectively.
- Set the multiplexer ALARM DURATION option to the minimum number of seconds you wish each alarm event to be recorded.
- Set the VCR's time-lapse speed as desired.
- Set both the multiplexer VCR RECORD TIME and VCR ALARM RECORD TIME options to match the speed set at the VCR.

Controlled Alarm Recording

When alarm recording is controlled by the multiplexer, the VCR responds to the alarm signal provided by the multiplexer. The recorder goes into the alarm recording mode and records at the alarm record speed. It remains in the alarm mode until released by the multiplexer. Controlled alarm recording requires both video and alarm connections between the multiplexer and the VCR.

System setup for multiplexer controlled alarm recording:

1. Connect the multiplexer **vcr in** and **vcr out** connectors to the VCR's video output and video input respectively.
2. Connect the VCR's ground to the multiplexer **alarms** connector pin **17** (alarm output common).
3. Connect the VCR's alarm input to multiplexer **alarms** connector pin **19** if VCR alarm input polarity is active low or pin **18** if VCR alarm input polarity is active high.
4. Set the multiplexer ALARM DURATION option to the minimum number of seconds you wish each alarm event to be recorded.
5. Set the VCR's alarm duration option to "manual".
6. Set the multiplexer VCR ALARM RECORD TIME option to match the VCR's alarm recording speed. If using the autodetect VCR speed feature (pin **37** on **alarms** connector), the connections between the multiplexer and VCR permit each unit to change recording speed as needed. See *Alarm Output* and *Autodetect VCR Speed* for details.
7. Set the multiplexer VCR RECORD TIME option to match the VCR's normal recording speed.

APPENDIX C
IN CASE OF TROUBLE

If you experience difficulties during the installation or operation of the multiplexer, review the section of this manual which explains the related feature or task. If necessary, consult the troubleshooting table on the following pages.

If the problem cannot be resolved, you may have to contact Technical Support. When you call, the representative will ask you to provide specific information about the installation. To save time, spend a few minutes getting organized before you pick up the telephone.

Before calling, have the following information ready:

- The serial number of your multiplexer.
- The make and model of each piece of hardware connected to the multiplexer.
- Approximate date of purchase and of installation.
- A specific description of the problem.

NOTE: Please do NOT return any product to the Factory without first obtaining a Return Authorization (ra) number. Failure to do so can result in a significant delay in processing your repair. Contact Technical Support to obtain an authorization number.

Sensormatic Video Products Division
Technical Support
(800) 440-5334
(858) 642-2400

TROUBLESHOOTING GUIDE		
PROBLEM	POSSIBLE CAUSES	SUGGESTED ACTION
Video Problems in Live Mode		
Live pictures too bright, too dark, bad color or gray tones.	Monitor not correctly adjusted.	Adjust monitor using gray or color bars, as applicable.
	Termination not set correctly.	Check termination switches on back panel for each camera output.
Some live pictures too dark.	Camera iris is not correctly adjusted.	Adjust camera iris using calibrated monitor.
Some live pictures too light.	Some cameras are not terminated.	Check rear panel switches for each camera, set for 75 ohms.
	Camera iris is not correctly adjusted.	Adjust camera iris using calibrated monitor.
Black horizontal lines in picture, picture unstable.	Faulty camera sync or video output.	Replace affected camera with a known good camera.
One or more camera images do NOT change.	VIDEO LOSS ALARM set to **OFF**, or VIDLOSS message cleared before video loss is fixed.	Change display format, if camera window is blank, check video connections and camera.
Video Problems in Tape Mode		
Poor pictures, bad color, image unstable.	VCR faulty or requires maintenance.	Perform periodic maintenance and test VCR performance.
RECORDER STOPPED message on monitor.	Operator changing operating mode of unit.	For tape playback, press play on the VCR.
Motion Detection Problems		
No alarm when motion is detected at some or all cameras.	Camera ALRM option set **OFF**, no motion detection for those cameras.	Set ALRM option to **ON** for each camera needing motion detection.
	ALARM MESSAGE DISPLAY set to **AND**, both contact alarm and motion needed for alarm.	Check contact alarm device and connection to alarm input pin. Use **TST** to check motion settings.

Table 2 — Troubleshooting Guide

TROUBLESHOOTING GUIDE		
PROBLEM	POSSIBLE CAUSES	SUGGESTED ACTION
Motion Detection Problems		
Important motion not detected.	Motion targets turned off, SENSE (sensitivity) too low or DELAY too long.	Turn on motion targets where needed, check SENSE and DELAY settings.
Unimportant motion detected.	Unnecessary motion targets turned on, SENSE too high or DELAY too short.	Turn off unneeded motion targets, check SENSE and DELAY settings.
Motion detected when no motion occurred.	Camera is random interlace type, video is not stable or camera mounting is loose.	Replace camera or substitute another model to test. Check camera mounting.
Alarm Detection Problems		
No alarm message.	ALARM MESSAGE DISPLAY set **OFF**.	Set ALARM MESSAGE DISPLAY **ON**.
No alarm tone heard.	AUDIBLE ALARM set **OFF**.	Set AUDIBLE ALARM **ON**.
No response to a contact alarm input or continuous alarm when alarm input is connected.	Alarm not connected properly.	Check connections and correctly connect alarm.
	Alarm device polarity and multiplexer alarm input polarity do not match.	Change alarm device polarity or multiplexer alarm input polarity.
Remote Control Problems		
No response to remote control panel. Remote control panel LEDs off, remote panel beeping.	Remote panel data cable plugged into **remote out** connector.	Plug remote panel data cable into **remote in** connector.
	Remote panel data cable loose.	Reconnect remote panel cable.
No response to remote control panel. Remote control panel LEDs off.	Remote panel power cable loose or not connected.	Check remote panel power cable connection.
No response to remote input.	Serial communications protocol not correct.	Configure remote device for 1200 bps, 1 start bit, 8 data bits, 1 stop bit, no parity.

APPENDIX D TECHNICAL SPECIFICATIONS

The following specifications apply to Robot multiplexer series products only. Robot reserves the right to revise and improve its products. All specifications are therefore subject to change without notice.

Operating Defaults

Format	Displays all cameras
Display	Live
Switcher	Sequence off
VCR Record Time	24 hours
VCR Alarm Record Time	02 hours
Alarm Duration	4 seconds
Alarm Message Display	On
Global Dwell	2 seconds
Alarm Message Latch	Off
Video Loss Alarm	On
Audible Alarm	Off
Alarm Input Polarity	Active low
Alarm Output Polarity	Active high
Pass-Thru Extrnl Alrms	Yes
Image Tenderizer	On
Camera Titles	Camera number
Motion Setup Screen	All targets selected
Motion Alarm (ALRM)	Off
Sensitivity (SENSE)	Medium (MED)
Object Size (SIZE)	1 Wide by 1 High (1Wx1H)
Alarm Delay (DELAY)	Off
Security Lock	Off

Video Format

NTSC/EIA or PAL/CCIR

Video Level	Camera Inputs	1.0 V p-p, 75 ohms
	Camera Outputs	1.0 V p-p, 75 ohms
	VCR Inputs: Composite	1.0 V p-p, 75 ohms
	VCR Inputs: S Video	Luma 1.0 V p-p, 75 ohms Chroma(burst)285mV p-p, 75 ohms
	VCR Outputs: Composite	1.0 V p-p, 75 ohms
	VCR Outputs: S Video	Luma 1.0 V p-p, 75 ohms Chroma (burst) 285mV p-p, 75 ohms
Alarm	Camera Alarm Input	One input per camera. Contact or TTL/CMOS signal. Polarity selectable.
	Alarm Hold Input	+5 to +15 VDC or TTL/CMOS active high signal.
	Alarm Duration	4 second default. Menu selectable from 2 to 999 seconds.
	Alarm Output	Normally open (NO) and normally closed (NC) contacts with shared common; 2.0 A at 30 VDC (resistive only); 1.0 A at 125 VAC (resistive only).
	Alarm Outputs	One output per camera, TTL/CMOS (selectable polarity).
Display	Color Palette	16,777,216 colors (24 bits)
	Gray Shades	256 (8 bits)
Resolution	Full Screen Format	512x464 pixels (512x512 PAL)
	2x2 Format	256x232 (256x256 PAL)
	3x3 Format	170x154 (170x170 PAL)
	4x4 Format	128x116 (128x128 PAL)
	PIP Insert	128x116 (128x128 PAL)
	Zoom Display	Interpolated 512x464 (512x512 PAL)

Controls	General	Soft touch, rubberized push buttons with indicator lights.
	Function (1 cam)	Used in combination with other buttons to access special functions.
	Full Screen (Zoom)	Selects full screen, 2x zoom display or program menu.
	PIP (Up)	Selects Picture-In-Picture display or UP function.
	2x2 (Down)	Selects 2x2 picture display or DOWN function.
	3x3 (Left)	Selects 3x3 picture display or LEFT function.
	4x4 (Right)	Selects 4x4 picture display or RIGHT function.
	Live	Selects camera inputs for viewing.
	Tape	Selects VCR input for viewing.
	Sequence	Selects sequential camera display, either full screen or in lower right window of multicamera display.
	Call	To change display on call monitor.
	Camera	Selects camera for viewing or single camera record.

Connectors	Power	2.1 mm pin-type female. Power input.
	Remote	RJ11. Remote control via remote panel option or ASCII commands.
	Alarms	DB37-S. Alarm control via contact or TTL/CMOS signal.
	Call Mon	BNC. Video signal output to call monitor.
	Main Mon	BNC. Video signal output to main monitor.
	S-VHS In	S-Connector. S-Video input from VCR (color models only).
	S-VHS Out	S-Connector. S-Video output to VCR (color models only).
	VCR In	BNC. Composite video input from VCR.
	VCR Out	BNC. Composite video output to VCR.
	Cam In	BNC. Composite video input from camera.
	Cam Out	BNC. Composite video output from camera (passive loop through).
	Termination switches	75 ohms input impedance (**75** Ω) or **∞** for looping to other equipment.

Electrical	Power Requirement	18 Watts (center positive 12 VDC)
Physical Characteristics	Dimensions	17 in (432mm) Wide
		12.2 in (311mm) Deep
		1.75 in (44mm) High
	Unit Weight	9 lbs (4 kg)
	Shipping Weight	11 lbs (5 kg)
	Environmental Requirements	Temperature, 40–104° F (5–40° C)
		Humidity, 5–95%RH Noncondensing
		Operating altitude, 0–10,000 feet (3,048 meters)
Options	Remote control panel	Kit includes: remote control panel, 50 ft. cable, desktop stand and rack mount bracket
	19-inch rack mount kit	RM03